

## TECHNOLOGY FACT SHEET

### HIGH-POWER, LOW-COST TWO-PATCH ARRAY ANTENNA SYSTEM

#### Introduction

This invention presents a breakthrough in low-profile, lightweight, highly efficient antennas. Researchers at the Sensors and Electron Devices Directorate of the U.S. Army Research Laboratory (ARL), Adelphi, Maryland, designed, built, and successfully tested a new two-patch array antenna system optimized in a novel way that results in system performance characteristics equivalent to much larger antennas, but with a compact, high-power, high-efficiency, low-profile architecture suitable for integration in a wide variety of security, sensing, and protection platforms.



PSR system indentifying personnel on airport runway

#### Concept

The increased need for situational awareness has stepped up demand for compact antennas that can provide reliable radar transmission. One such application is perimeter surveillance radar (PSR). PSR is a class of radar sensors that monitors activity within or near critical infrastructure areas, including seaports, military installations, national borders, refineries, and airports, as depicted above (image source: NASA). Such radars are characterized by their ability to detect ground-level movement of targets, such as an individual advancing toward a facility. PSRs typically have an effective range of several hundred meters or more. The ARL's invention can enhance existing PSR systems by offering a low-cost, compact antenna array with an appreciable extension in bandwidth capability.

#### Invention Overview

- ❖ Novel compact antenna array achieves performance of much larger conventional antennas
- ❖ Does not require ancillary equipment or signal-processing techniques
- ❖ Multiple areas of use, including border/perimeter surveillance, vehicle collision avoidance, navigation aids, and portable radar
- ❖ TRL 6 – Fully functioning lab-scale manufacturing prototype and test data available
- ❖ U.S. Patent 7,692,592

#### Doing Business with ARL

- ❖ ARL is a leader in partnering with domestic firms
- ❖ Successfully developed and implemented innovative tools to ease the technology transfer process
- ❖ Tools include Patent License Agreements (PLAs); Cooperative Research and Development Agreements (CRADAs); Test Services Agreement (TSA); and others
- ❖ Visit [www.arl.army.mil](http://www.arl.army.mil) for more information

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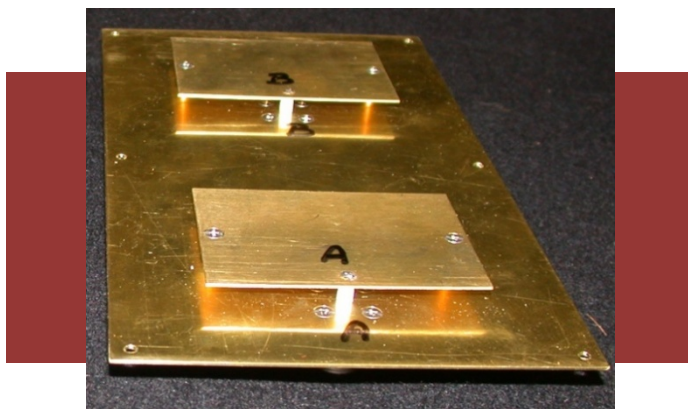
### Features/Capabilities/Intellectual Property

Antennas have a wide variety of configurations, from the whip or mast-like devices employed for radio and television broadcasting to the large parabolic dish devices used to receive satellite signals and radio waves generated by distant astronomical objects. Many types of advanced electronic devices, such as telematics units in vehicles and other navigation aids, need an effective and efficient antenna for communicating with other fixed or mobile RADAR units. Traditional whip, dish, and other antenna configurations are simply inadequate for perimeter surveillance systems.

ARL's invention provides a novel technology via a high-efficiency, high-power two-patch array antenna system. The array can be precisely positioned to obtain the desired electrical performance (e.g., frequency response, gain). With its configurable design, the antenna system performs like a much larger antenna, yet its architecture is low-profile and suitable for integration into a number of commercial and military applications.

Other features/capabilities/intellectual property offered by this invention include the following:

- Reduced interference with existing structures
- Reduced size (thinner and smaller) compared with existing systems
- Construction materials are commonly available
- IP includes novel antenna design and assembled device



*Bandwidth enhanced, low-cost, efficient patch antenna (Image source: ARL)*

### Potential Markets/Applications

The ARL's invention will benefit existing military applications, particularly as an enhancement to existing radar-based systems. It will also enable the development of future systems that can leverage the wideband, highly configurable, low-cost attributes of this system.

Likewise, the invention will likely benefit various commercial applications since antennas are critical to a variety of RADAR-based technologies, such as vehicle collision avoidance systems and microwave motion detectors.

### Key Advantages & Benefits

- ❖ *Novel patch design increases bandwidth and reduces weight and profile*
- ❖ *Fabrication amenable to commercial-scale production*
- ❖ *Low cost of manufacture*
- ❖ *Robust, highly reliable design*
- ❖ *Inventor team available to work with commercialization partner*

### Contact Information

This technology was developed by ARL. It is now available for licensing and CRADA opportunities.

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